

GOVERNMENT RESEARCH
IN THE
NORTH
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GOVERNMENT RESEARCH IN THE NORTH

A list of the types of environmental investigations being pursued by various government departments and agencies in 1972 under the direction of the Task Force on Northern Oil Development.

The investigations form part of a three-year study by the Government of Canada at a cost of \$15 million.

The project list is attached.

- 30 -

Project No. 1 - River Survey - Yukon Territory

As far as the Yukon is concerned, but with regard to the Yukon Territory.

Project No. 2 - River Survey - Yukon Territory

Data collected in this project will be used to determine the quality and quantity of river flow and water quality. This will be done by means of a series of river flow and water quality surveys. Additional information is also required, at the request of the Fisheries Service and the Northern Development Board, on river flow and water quality. This will be done by means of a series of river flow and water quality surveys. The work will be conducted by the Water Survey of Canada.

Project No. 3 - Survey of Ice Effects

The main objective of this project is to determine the location and magnitude of ice jamming and ice cover along rivers and streams in the Yukon Territory. A second objective is to obtain a better knowledge of river flow and water quality characteristics in order to aid the preparation of preliminary assessment studies in areas of river crossings. This work will be conducted by the Hydrologic Sciences Division of DCE.

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Project No. 1 - Aquatic Ecological Studies

The specific objective of this survey work is to use aquatic plants and animals as indicators of disturbance. By this means it will be possible to identify river and stream areas that will be sensitive to disturbance. A more general objective is to improve our knowledge of aquatic plants and animals and their habitats because these organisms are important as "early warning" sensors of environmental changes, including those changes that can be expected to accompany pipeline construction activities in the vicinity of streams and rivers. These surveys will be conducted by the Fisheries Research Board.

Project No. 2 - Fish Surveys - Mackenzie Valley

The object of this work is to obtain an inventory of fish species and to determine their migration routes, times of migration, and location of spawning areas. This information will be used to specify how pipeline routes, timing, and construction methods for stream crossings can be made to minimize disruptions to fish migrations, spawning areas and food sources of the fish. Studies by the Fisheries Research Board are a necessary part of this latter question of how to minimize damage to food sources of fish. The work will be conducted by the Fisheries Service.

Project No. 3 - Fish Surveys - Yukon Territory

Same as for No. 2 above, but with regard to the Yukon Territory.

Project No. 4 - Stream Flow Surveys

Data collected in this project will indicate possible flood magnitudes and thus areas where pipelines might be prone to rupture by floods and also river-level forecasts for barge traffic. Additional information is also required, at the request of the Fisheries Service and the Fisheries Research Board, on sediment conditions because these influence the quality of fish spawning areas. The work will be conducted by the Water Survey of Canada.

Project No. 5 - Survey of Ice Effects

The main objective of this project is to determine the location and magnitude of ice jamming and ice scour along rivers and streams to be crossed by pipelines. A second objective is to obtain a better knowledge of river channel and river flow characteristics to assist with the preparation of precautionary measures needed in areas of stream crossings. This work will be conducted by the Hydrologic Sciences Division of DOE.

Project No. 6 - Water Quality Surveys

The identification of sensitive aquatic habitats, by the Fisheries Research Board, is dependent upon information on the water quality characteristics and nutrient status of the main river and its tributaries. Such information can be used to identify areas where the productivity of aquatic organisms, including fish, is dependent upon a periodic or regular flush of dissolved and suspended nutrients, with the intention that such areas should receive minimal disruption during pipeline construction activities. This work will be carried out by the Water Quality Division of DOE.

Project No. 7 - Wildlife Ecological Studies

This project will result in the production of maps that show locations of fur-bearer production areas, areas of ungulate production, migration and breeding, and other kinds of wildlife habitat that are of importance to northern residents. Because of the international importance of migratory birds, attention is also being given to the identification of waterfowl production and staging areas. This mapping project will establish units of the proposed pipeline routes that are of insignificant importance to wildlife and will grade those habitats that are significant so that route selection and special protective measures can be specified. The work will be conducted by the Canadian Wildlife Service.

Project No. 8 - Vegetation Studies

Documentation of relationships between vegetation, landform and permafrost and mapping of terrain units that vary in their sensitivity to surface disturbance will allow identification of segments of a pipeline route that will be most susceptible to serious thermal erosion or flow-slides. Studies of vegetation in relation to the restoration of stability to the active layer after there has been a disturbance will assist with the formulation of requirements for replacement of vegetation or other forms of insulation after a disturbance such as a pipeline excavation. The mapping and description of existing forest and non-forest vegetation will assist in the identification of areas of special ecological interest which should be protected during pipeline construction. This work will be conducted by the Canadian Forestry Service.

Project No. 9 - Topographic Mapping and Air Photography

Preparation of air photographs and topographic maps required for various environmental investigations relating to pipelines in the Mackenzie area will be continued in 1972-73 by the Surveys and Mapping Branch through industrial contracts. By the end of the year air photography will be complete and more than half of the maps will be ready.

Project No. 10 - Earthquake Hazard, Temperature
Characteristics of Permafrost

In order to provide an adequate estimate of seismic risk to pipelines, processing of seismic data for the region will be continued at an accelerated rate during 1972-73 by the Earth Physics Branch. The Earth Physics Branch will also continue to provide information on temperature and thermal properties of near surface materials, as an input to the investigation of permafrost and terrain stability by Geological Survey of Canada (Project No. 12)

Project No. 11 - Terrain Inventory Surveys

Systematic surveys and mapping of terrain conditions in the Mackenzie pipeline area by the Geological Survey of Canada will be continued in 1972-73, providing information on near surface earth and rock materials, landforms, permafrost and ground ice, muskeg, including river bank, coastal, and near-shore conditions. By the end of the year preliminary maps at 1:125,000 scale will be available for the whole area. This work involves integrated surveys in which investigations of soils, vegetation and hydrology by various agencies are conducted in conjunction with the geological work.

Project No. 12 - Permafrost Terrain Properties
Performance, and Hazards

The Geological Survey of Canada will continue, complete and commence a variety of investigations of the properties, stability and instability of the ground under permafrost conditions in the Mackenzie area. They include engineering study of properties of frozen materials, stability of slopes and related terrain hazards; development of geophysical methods for locating frozen materials, stability of slopes and related terrain hazards; development of geophysical methods for locating frozen ground; and case histories of permafrost terrain disturbance.

Project No. 13 - Terrain Sensitivity Rating & Mapping

During 1972-73, development and production of terrain sensitivity maps will be continued by the Geological Survey of Canada. These maps will relate terrain performance to disturbance involved in pipeline and related land use preliminary Atlas-type maps providing a simplified terrain classification will be available for the Mackenzie pipeline area within the year. Preparation of more detailed maps will continue.

Project No. 14 - Evaluation of Line Pipe and Pipeline Steel

During 1972-73, the Mines Branch will continue evaluation of line pipe of Canadian and foreign manufacture, with special reference to Arctic conditions and will commence development of higher strength pipe. This investigation will contribute to structural safety of gas and oil pipelines in the north and thus reduce the possibility of environmental pollution through pipeline rupture.

Project No. 15 - Land disturbance studies in the Boreal Forest Region in the Mackenzie River Valley

An appraisal of vegetation, soils and landform relationships with particular reference to the erosion hazard created by the removal of forest cover and other construction activities. The work will be carried out in collaboration with the Geological Survey of Canada. The results will assist in determining terms and conditions to be set for the construction and operation of pipelines.

Project No. 16 - Vegetation studies in the Lower Mackenzie Valley Region

The project will investigate the extent of thermokarst and thermal erosion as a function of vegetative cover and soil composition in order to develop guidelines to minimize terrain damage. Vegetative regeneration techniques as a means of stabilizing areas of thermokarst and thermal erosion will also be studied.

Project No. 17 - Disturbance studies in the Lower Mackenzie River Region

This project will investigate the maintenance, degradation and restoration of ecosystems exposed to surface disturbance in regions of continuous and discontinuous permafrost. Roads, winter roads, seismic lines and well drill sites will be investigated. The results will be used to predict the ecological consequences of pipeline construction and to develop guidelines for route selection and construction and operational procedures.

Project No. 18 - Energy Budget Components in Arctic Environment

Measurements of physical parameters, including soil moisture content, soil density, solar radiation, atmospheric temperature and humidity, will be carried out in disturbed and undisturbed areas of the lower Mackenzie River in order to develop an understanding of the effect of basic physical features, including the extent of surface disturbance, on the stability of permafrost. The results of these studies will assist in determining terms and conditions to be set for the construction and operation of pipelines and in the identifying of areas to be avoided when selecting pipeline routes.

Project No. 19 - Land Based Oil Spills

Investigations will be carried out on methods of prevention, containment and recovery of oil spills; on the ecological consequences of oil spills; and on techniques of ecological restoration after oil spills and clean-up work. The results of the studies will assist in determining conditions to be set concerning possible oil spills.

The Arctic Petroleum Operators Association is collaborating in this project by preparing a statistical analysis of the incidence and type of pipeline failure in North America. This analysis will be evaluated with a view to estimating the risk of failure in different kinds of terrain along the proposed pipeline route.

Project No. 20 - Waste Disposal Study

This project is for the purpose of determining the best methods for effective disposal of waste from mobile exploration camps and semi-permanent construction camps. It will be carried out in cooperation with the Public Health Engineering division of the Department of the Environment. The findings of the study will be of paramount importance in setting anti-pollution terms and conditions to be followed during construction and operation of pipelines.

Project No. 21 - Information Bank

The project will develop a computerized bibliographic file of information pertaining to the proposed pipeline development. The file will function as an information storage and retrieval system and will be capable of being continuously updated.

Project No. 22 - Terrain Surveys & Mapping

This work will consist of a geological mapping of the broad area through which the pipeline corridor is expected to run and the development of a methodology for producing a terrain sensitivity index. The index will provide a measure of the environmental impact of different land use activities. The results will facilitate the selection of a pipeline route and the setting of terms and conditions for pipeline construction and operation. The work will be carried out by the Geological Survey of Canada on behalf of DIAND (see projects nos. 11, 12 and 13).

Project No. 23 - Regional Economic Impact Study

The objectives of the study are to gain information:
to indicate the benefits and costs of pipeline development to northern residents, Territorial and Federal Governments; to provide an information base for assessing the submission of private industry making applications for the construction of large diameter pipelines in the Territories;

to assist northern residents in participating in economic developments resulting from projected pipeline(s) construction and maintenance;

to provide information necessary to the development of Government policies for the optimization of economic benefits and potentials during both the short and long term periods of pipeline(s) development and maintenance in the Yukon and Northwest Territories and the minimization of any detrimental effects; and

to provide information required by the Territorial Governments for development planning.

This project is being carried out by the Economic Staff Group of DIAND and is being coordinated with the National Economic Impact Study being carried out by the Economic Committee of the Task Force on Northern Oil Development.

Project No. 24 - Regional Socio-Economic Impact Study

This project which is supplementary to the Regional Economic Impact study outlined above is to assist in providing information about possible socio-economic consequences of a proposed pipeline, to consider the implications of a pipeline for local social and economic expectations in the effected communities and the possible emergence of social problems of various kinds. It will assist in developing recommendations for policy to maximize economic and social benefits for native northerners and minimize negative consequences of pipeline development. This aspect of the study is being conducted by the Northern Science Research Group of DIAND.

Project No. 25 - Archaeological Studies.

The purpose of this study is to identify in advance locations of archaeological and historical significance which will require special consideration and treatment in the selection of pipeline routes, and in the setting of terms and conditions under which a pipeline may be constructed and operated. The project will be coordinated by Northern Economic Development Branch of DIAND and will be carried out in cooperation with the National Museum of Man and the Territorial governments.

Project No. 26 - Sociological Study

The purpose of this study is to make an assessment of the effects of the planning and proposed construction of the Alyeska pipeline and to relate what is happening in Alaska to what may happen in Canada. The primary objective will be to identify unfavourable results and permit action to be taken to avoid similar unfavourable results in Canada. This project will be under the direction of the Northern Science Research Group of DIAND.

Project No. 27 - Program Management Advisory Group

This is to provide for the various administrative costs of the operations of an Advisory Group to the Environmental-Social Committee of the Task Force on Northern Oil Development.

Project No. 28 - Program Management

This is to provide for the various administration and management costs of the central coordinating unit, i.e. Environmental-Social Program, Northern Pipelines. The unit is responsible for the coordination of the work of the Departments of Energy, Mines and Resources, Environment, Indian Affairs and Northern Development, the Northwest Territories and the Yukon Territory. The unit is also the primary point of contact with northern groups, industry, conservation organizations and other interested agencies. It will be responsible for making recommendations for pipeline routes and for coordinating the development of terms and conditions under which pipelines may be constructed and operated.

Project No. 29 - Program Management

Professional and other services to cover the costs of critical path charting of the work in progress, special reports and publications, public information program, and other special studies, including financial support of planning and sociological studies to be carried out by the governments of the Northwest Territories and the Yukon Territory.

Project No. 30 - Pipeline Regulations.

The purpose of this project is to develop appropriate regulations and control measures concerning: the design, construction and operation of pipelines to minimize erosion; drainage along pipeline ditches to prevent washouts; construction methods in permafrost with different types of soil. Much of this work involves determining the ways and means of translating the findings of other investigations into actual technical requirements of pipeline construction and operation. The project will be carried out by the National Energy Board.

Date Due

JUL 31 '72			
OCT 25 '72			
NOV 23 '72			

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OCT 25 '72

NOV 9

Donald R. Kill

NOV 23 '72

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2. A bulldozer pushes gravel on top of 48" pipe at the Inuvik
Test Facility of the Mackenzie Valley Pipe Lines Research Limited.

(Mackenzie Valley Pipe Line Research Ltd. photo)

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CAPTIONS FOR PHOTOGRAPHS

1. Mr. Dave M. Roebuck of the Physical Metallurgy Division of Mines Branch of the Department of Energy, Mines and Resources checks for lamination and possible internal defects in the metal and weld of a 48" pipe. This is one of many tests conducted by the division on various types of pipes submitted for examination.

(EMR Photo)

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3. A core sample of permafrost taken on the proposed pipeline
right-of-way is removed for detailed study.

(Mackenzie Valley Pipe Line Research Ltd. photo)

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